



## **AAR-100**

### **Human Factors Newsletter # 03-17**

**September 27, 2003 – October 10, 2003**

**FAA Research Grant to Wichita State University (General Aviation Center of Excellence Program):** Review of the FITS Program - Program tasks, goals, and pilot training initiatives.

Through the FITS (FAA/Industry Training Standards) program, the FAA seeks to be more responsive to two significant changes in general aviation (GA): one is technological and the other change is in the aviation market place. The technological changes include the availability of multifunction displays, use of GPS (Global Positioning Systems) for navigation, real-time displays of flight path (e.g. highway in the sky, HITS) and weather information. Many of these technologies will be offered as part of new integrated avionics suites on advanced reciprocating and jet-powered aircraft. The second development increases an individual's options when selecting a mode of transportation. Corporate and on-demand air taxis have complemented the established air-carrier hub and spoke systems. The FAA has pointed out that GA has the potential of providing point-to-point travel for those seeking to avoid the hassles associated with commercial aviation, especially after 9/11. These developments will require new pilot training programs not only for initial, transition and recurrent training, but also to train pilots in the use of a specific avionics package/suite. The new training programs will emphasize single pilot resource management, as the pilot must monitor and integrate information from multiple displays.

Fulfillment of this vision of aviation requires that GA accident rates continue to improve, thus increasing public confidence in this alternate form of transportation. The time and cost of training must also be reduced to facilitate the development of a larger population of private pilots for whom this mode of transportation would be an option. How each of these goals is to be accomplished under FITS is described below.

- Reducing GA accident rates

Under FITS, this will be achieved by providing the pilot with more information, thus increasing pilot situational awareness. This information will include real time weather (NEXRAD images), traffic avoidance (TCAS), Terrain Awareness & Warning Systems (TAWS) and GPS-driven moving map displays for navigation. Although more information is always desirable from the user's perspective, it does not necessarily follow that safety will be

improved. Increasing the number of information sources raises the potential for information overload, especially during critical phases of flight or during emergency situations.

The availability of more information sources is likely to have an impact in other areas. For instance, training in the management of the information as a function of the phase of flight will be critical. Competency requirements for using the equipment must also be established. What functions of the system should the pilot be capable of demonstrating for licensure? In a related matter, will the nomenclature, organization (menu hierarchy, options, etc) of menus be standardized across manufacturers or will each system require a different type certificate? How will the technology affect pilot work load and the time spent looking heads-up versus heads-down?

Finally, the FITS program places greater emphasis on single pilot resource management and training to improve pilot judgment. How specifically this is to be done is not clear, but it is essential given that the availability of this information may bias decision-making in unintended ways. Pilot confidence in these technologies tends to be high; however, each has its limitations. For example, the accuracy of the GPS signal declines as the availability of satellites varies or the signal is masked or shielded by terrain or aircraft parts. Similarly, the availability of more detailed weather information may increase the likelihood of pilots electing to fly in marginal conditions or to use the display for other than its intended purpose.

Although researchers have begun to address some of these issues, these findings are not likely to influence display design or training for several years — too late for the first generation of FITS aircraft.

- Changing pilot training

The FITS program proposes to change pilot training to make it more *relevant* to real world flying. This approach is captured very well by the mantra borrowed from the military of “train the way you will fly and fly the way you train”. More specifically, the FITS program emphasizes a shift from traditional sequential skill acquisition to a “scenario-based” training program wherein many of the flying skills are practiced as part of a scenario.

- Standard versus combined private pilot and instrument rating

To reduce the time to train pilots, FITS has encouraged the development of a combined curriculum for the private pilot certificate and instrument rating. The stated goal of this initiative is reducing training time and cost.

- Use of Personal Computer-based Aviation Training Devices

Flight training under FITS would also rely more on Personal Computer-based Aviation Training Devices (PCATD's) for initial skill and recency training. The findings of FAA funded research indicate that practice on a PCATD is at least as effective as practice in an airplane or an in Flight Training Device (FTD) in meeting FAA recency of experience

requirements for instrument flight. The PCATD's appear to hold great promise as a tool for improving training effectiveness and efficiency while controlling time and costs.

The training initiatives endorsed by FITS represent a significant change in existing aviation flight training and may have the desired effects of improving safety, and reducing the time and cost of training. However, these benefits will not be realized unless careful consideration is given to a number of issues. Can a combined flight curriculum produce equally proficient pilots in the same or less time as a standard curriculum? Do the proposed training programs leverage the respective advantages of skill- and scenario-based training programs without incurring their weaknesses? What are the important characteristics of a scenario for positive transfer of training to real world flying? What skills or abilities are better trained using scenarios? What flying skills or knowledge can be effectively trained using self-paced PCATD's?

- Research approach

The purpose of the proposed research is to review the objectives of FITS and the current state of research and technology needed to support these goals. This information can be used by the FAA to identify research areas that would aid achievement of FITS' goals. Below follows a description of each task and how it will be accomplished.

- Review the objectives, plans and organization of the FITS program. In preliminary discussions of this project, industry representatives expressed some confusion regarding the aims of the FITS program and how it might impact different aircraft manufacturers and flight training schools. The purpose of this task is to create a roadmap to FITS so that FITS-related activities and initiatives can be understood within the framework of its broader goals of improving GA accident rates and supporting the development of a new mode of transportation. This task will be accomplished by reviewing published documents describing the FITS program and by having discussions with FAA, academic, and industry representatives closely associated with the program.
- Review findings of government-funded research pertinent to the objectives of FITS including reports on the effectiveness of new displays (i.e., integrated highway-in-the-sky, primary and multifunction displays, etc.) and new training methods (scenario-based training, PCATD's) to meet recency requirements. Published technical reports from research projects supported under the AGATE, CAPSTONE, SATS and CGAR programs will be reviewed.
- Review of research findings published in the academic literature that is pertinent to goals/objectives of FITS. This will consist of investigations evaluating the effectiveness of different training techniques including computer-based training, integrated private/instrument curriculum, comparisons of skill based testing and scenario based training and testing, and human factors evaluations of the effectiveness of new displays, including multifunction displays.

- Review the goals of the FITS program with flight training schools, aircraft and avionics manufacturers, and individuals who have used or have been involved in training pilots to use this technology (i.e. CAPSTONE participants). The goal of this task is to document what these groups believe are the major obstacles (training, regulatory, and technical issues) to fielding these new technologies. This will ensure that future research initiatives address these potentially critical issues.

Grant Technical Monitor: Kip Krebs, AAR-100

**In-flight Medical Incapacitation and Impairment of U.S. Airline Pilots:** The CAMI Medical Research Team completed a study to evaluate airline pilot incapacitation and impairment during flight. National Transportation Safety Board and FAA databases were reviewed for incapacitation/impairment events. Results from this study were submitted for publication as an OAM report: "In-flight Medical Incapacitation and Impairment of U.S. Airline Pilots: 1993 to 1998," DeJohn, C., Wolbrink, A., and Larcher, J. This research identified 47 pilot incapacitation/impairment events (39 incapacitation events and 9 impairment events). Findings showed that the frequency of incapacitation increased with pilot age, with loss of consciousness being the most frequently reported event. The study suggests that safety of flight was seriously impacted in seven of the 47 events, and pilot impairment may have resulted in two non-fatal accidents. This information will help the Office of Aerospace Medicine monitor pilots with specific medical conditions associated with the risk of incapacitation, and will examine the appropriateness of decisions being made concerning airman medical certification. (J. Whinnery, CAMI)

**STAIRS:** Dr. Dana Broach (Selection & Validation Research Team, Training & Organizational Research Laboratory, AAM-520) traveled to the Central Region office in Kansas City, MO to conduct the third subject matter expert (SME) panel in support of development of the Structured Aircraft Certification Supervisory Selection process (STAIRS). Five incumbent 1st-level supervisors from Aircraft Certification Small Aircraft Directorate (ACE-100) participated in the panel September 15-16, 2003. The panel reviewed, revised, and finalized the list of supervisory tasks/duties and knowledge, skills, abilities, and other personnel characteristics required in 1st-level supervisory positions in Aircraft Certification. After a final headquarters staff review, the lists will be translated into a survey form to be administered via the Internet to all incumbent Aircraft Certification 1st-level supervisors and 2nd-level managers later in the fall. (D. Broach, CAMI)

**ATC Specialist Performance and Age:** Drs. David Schroeder (Manager, Aerospace Human Factors Research Division, AAM-500) and Dana Broach (Personnel Research Psychologist, Training & Organizational Research Laboratory, AAM-520) traveled to FAA Headquarters on September 3, 2003 to meet with the Director, Air Traffic Resource Management Program (ATX-1) and staff with regard to human factors research on air traffic control specialist performance and age. ATX requested that the Aerospace Human Factors Research Division conduct research to support development and validation of standards and criteria for determining which controllers possess "exceptional skills and abilities" for issuance of a waiver. The CAMI team provided an overview of the research on which the current retirement rule is based. They also presented a range of research options to consider. Discussion focused on two of the options: (a) a study of the individual differences among controllers used by operations supervisors and managers in the

assignment of positions and work; and (b) a study of the incidence of en route operational errors and age. A research plan for the study of individual differences used in making work assignments was submitted to ATX-200 on September 15, 2003. In the plan, dependencies on Air Traffic for concurrence and/or resources (e.g., access to facilities, data, and personnel) were clearly identified. It is expected that research will begin soon. (D. Broach, CAMI)

**ETMS:** On October 7-9, Tanya Yuditsky/ACB-220 attended a meeting of the Traffic Management User Team to review software requirements and design options for several Enhanced Traffic Management System (ETMS) functions. Together with a software developer from the Volpe National Transportation Systems Center, she presented prototypes of design options and discussed the benefits and drawbacks of each with the users. The final designs will be based on a combination of operational input from the users and human factors design principles. (E. Stein, WJHTC)

**FAA Flight Plan:** The FAA Flight Plan for 2004-2008 has been published and is now available on the FAA web site. You can access it from the FAA's brand new home page:  
<http://www1.faa.gov/avr/FlightPlan/>.

**R&D Review:** The fall issue of *R&D Review*, focusing on CAMI's human factors and medical research, is now being distributed. You can also view the issue on-line at:  
[http://research.faa.gov/docs/newsletters/rdreview\\_v02\\_i03.pdf](http://research.faa.gov/docs/newsletters/rdreview_v02_i03.pdf).

*More information on human factors research can be found at  
the FAA Human Factors (AAR-100) web site: <http://www.hf.faa.gov>*

Mark D. Rodgers  
FAA (AAR-100)



**October 13-17, 2003** – Human Factors and Ergonomics Society 47<sup>th</sup> Annual Meeting, Adams Mark Denver Hotel, Denver, CO <http://www.hfes.org/>

**October 15, 2003** – Royal Aeronautical Society Conference on Mitigating Human Error, London UK <http://www.aerosociety.com/homepage.asp>

**October 17-19, 2003** – EUROCONTROL IFATCA European Regional Meeting, Porto <http://www.eurocontrol.be/newsroom/events/index.html>

**October 19-21, 2003** – IEEE Symposium on Information Visualization, Doubletree Hotel, Seattle Airport, WA <http://infovis.org/infovis2003/>

**October 21-23, 2003** – 7<sup>th</sup> IEEE International Symposium on Wearable Computers, Crowne Plaza Hotel, White Plains, NY <http://www.cc.gatech.edu/ccg/iswc03/>

*October 21-23, 2003* – SAE Cabin Safety Technical Committee Meeting, New Orleans, LA [mlemank@sae.org](mailto:mlemank@sae.org)

**October 26-30, 2003** – ATCA 48<sup>th</sup> Annual International Technical Program and Exhibits, Marriott Wardman Park Hotel, Wash, DC [http://www.atca.org/static2\\_item.asp?item\\_ID=19](http://www.atca.org/static2_item.asp?item_ID=19)

**October 27-28, 2003** – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

**October 27-30, 2003** – SAE DoD Maintenance Symposium and Exposition, Valley Forge Convention Center, King of Prussia, PA <http://www.sae.org/calendar/aeromtg.htm>

**October 28-29, 2003** – Human Performance 2003 – Driving Progress in Individual and Team Performance, Houston, TX <http://advtech.jsc.nasa.gov/humanperf.asp>

**October 28-29, 2003** – Airbus Human Factors Symposium , New York City, NY <http://www.airbus.com/customer/events.asp>

**November, 2003(tentative)** – DOD TAG-50, Fall 2003, Phoenix, AZ <http://hfetag.dtic.mil/meetschl.html>

**November 4-5, 2003** – NASA/FAA Operating Documents Workshop VI: Updating your Data – The Future of Revisions. Orlando Airport Marriott Hotel, Orlando FL. <http://humanfactors.arc.nasa.gov/opdoc-workshopV/>

**November 4-6, 2003** – People in Control, 2003 – An International Conference on Engineering Human Factors Solutions, Hilton Amsterdam <http://conference.iee.org/pic2003/>

**November 5-6, 2003** – Royal Aeronautical Society Flight Simulation Group Conference on “Simulation of the Environment”, London, UK <http://www.raes.org.uk/homepage.asp>

**November 5-7, 2003** – ICAO-IATA Line Operation Safety Audit & Threat and Error Management Conference, Great Southern Hotel, Dublin, Ireland <mailto:sladenj@iata.org>, <mailto:dmaurino@icao.int>

**November 5-7, 2003** – FAA Centers of Excellence 3<sup>rd</sup> Joint Annual Meeting, Daytona Beach Hilton Oceanside Resort, Daytona Beach, FL [http://www.embryriddle.edu/research/FAA\\_COE\\_Meeting/index.html](http://www.embryriddle.edu/research/FAA_COE_Meeting/index.html)

**November 5-7, 2003** – 5<sup>th</sup> International Conference on Multi-Modal Interfaces, Marriott Vancouver Pinnacle Hotel, Vancouver, British Columbia, Canada <http://www.acm.org/uist/>

**November 10-13, 2003** – 56<sup>th</sup> Annual International Air Safety Seminar, J.W.Marriott Hotel, Wash, DC <http://www.flightsafety.org/seminars.html#iass>

**November 17-20, 2003** – 56<sup>th</sup> Annual Air Safety Seminar, A Joint Meeting of Flight Safety Foundation, International Federation of Airworthiness, and International Air Transport Association, Bangkok, Thailand <http://www.flightsafety.org/seminars.html>

**November 17-22, 2003** – Airbus A300/A310 Technical Symposium, Seville, Spain <http://www.airbus.com/customer/events.asp>

**December 1-4, 2003** – International Symposium on Human Factors in Telecommunications, Berlin, Germany [http://impcs3.hhi.de/HFT/HFT\\_03.htm](http://impcs3.hhi.de/HFT/HFT_03.htm)

**December 2-4, 2003**: National Training Systems Association Inter-Service/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, FL <http://www.trainingsystems.org>

**December 3-5, 2003** – FAA System Engineering Annual Workshop with Information Systems Security – Meeting Real World Challenges, Holiday Inn, Atlantic City, NJ <http://se-iss.tc.faa.gov>

**December 9-12, 2003** - Institute of Electrical and Electronics Engineers (IEEE) Decision and Control Conference, Maui, HI <http://www2.acae.cuhk.edu.hk/~ycliu/cdc03/>

**December 12-13, 2003** – Workshop on HCI Research in MIS, Seattle, WA [http://melody.syr.edu/hci/pre\\_icis03\\_wksp/index.cgi](http://melody.syr.edu/hci/pre_icis03_wksp/index.cgi)

**January 11-15, 2004** – Transportation Research Board Annual Meeting, Washington, DC <http://www4.trb.org/trb/annual.nsf>

*January 13-15, 2004* – SAE SEAT –Aircraft Seat Committee Meeting, Phoenix, AZ [mlemank@sae.org](mailto:mlemank@sae.org)

**January 13-16, 2004** – International Conference on Intelligent User Interfaces/Computer-Aided Design of User Interfaces, Island of Madeira, Portugal <http://www.iuiconf.org/>

**January 18-22, 2004** – Conference on Visualization and Data Analysis, San Jose Marriott and San Jose Convention Center, San Jose, CA <http://vw.indiana.edu/vda2004/>

**January 21 – 23, 2004** - AHS 4th Decennial Specialists' Meeting on Aeromechanics, Fisherman's Wharf, San Francisco, CA. For more information contact the Technical Chairman, Tom Maier at [tmaier@mail.acr.nasa.gov](mailto:tmaier@mail.acr.nasa.gov)

**March 15-17, 2004** – 16<sup>th</sup> Annual European Aviation Safety Seminar, Barcelona, Spain [http://www.flightsafety.org/eass04\\_cfp.html](http://www.flightsafety.org/eass04_cfp.html)

**March 22-24, 2004** – Eye Tracking Research and Applications Symposium, Menger Hotel, San Antonio, TX <http://www.e-t-r-a.org/>

**March 22-25, 2004** – HPSAA II Conference, Human Performance, Situation Awareness, and Automation Technology, hosted by Embry-Riddle Aeronautical University and the University of Central Florida, Hilton Oceanfront Resort, Daytona Beach, FL

<http://faculty.erau.edu/vincenzd/hpsaa>

**March 23-26, 2004** – 4<sup>th</sup> International Workshop on Smart Appliances and Wearable Computers, Tokyo, Japan <http://www.unl.im.dendai.ac.jp/IWSAWC/>

**April, 2004** – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita, KS <http://www/sae.org/calendar/aeromtg.htm>

**April 18-21, 2004** – FAA Worldwide Airport Technology Transfer Conference, Hilton Atlantic City Hotel, Atlantic City, NJ <http://www.airtech.tc.faa.gov/att04/>

**April 24-29, 2004** – CHI 2004, Conference on Human Factors in Computing Systems, Vienna, Austria <http://www.acm.org/sigchi/chi2004/>

**April 27-29, 2004** – 49<sup>th</sup> Annual Corporate Aviation Safety Seminar, Tucson, AZ [http://www.flightsafety.org/cass04\\_cfp.html](http://www.flightsafety.org/cass04_cfp.html)

**May 3-6, 2004** – 75<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

**May 6-8, 2004** - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact [Staff@vtol.org](mailto:Staff@vtol.org)

**May 10-12, 2004** – Royal Aeronautical Society 10<sup>th</sup> AIAA CEAS Aeroacoustics Conference, Manchester Town Hall, UK <http://www.aerosociety.com/homepage.asp>

**May 26-27, 2004** – Royal Aeronautical Society Conference – Flight Simulation 1929-2029, A Centennial Perspective, London, UK <http://www.aerosociety.com/homepage.asp>

**July 27-August 2, 2004** – 52nd Annual AirVenture, Oshkosh, WI <http://airventure.org/>

**July 28 – August 1, 2004** – 112<sup>th</sup> Convention of the American Psychological Association. Honolulu, Hawaii <http://www.apa.org/convention>

**August 1-4, 2004** – Designing Interactive Systems, Cambridge, MA <http://www.sigchi.org/DIS2004/>

**September 20-24, 2004** – Human Factors and Ergonomics Society 48<sup>th</sup> Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

**October, 2004** – 18<sup>th</sup> Airbus/JetBlue Human Factors Symposium, New York City, NY <http://www.airbus.com/customer/events.asp>



**October 18-19, 2004** – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

**October 23-27, 2004** – NordiCHI 2004, Tampere, Finland <http://www.cs.uta.fi/nordichi2004/>

**May 9-12, 2005** - 76<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO <http://www.asma.org/>

**August 18-21, 2005** - 113<sup>th</sup> Convention of the American Psychological Association, Wash, DC <http://www.apa.org/convention>

**October 24-25, 2005** – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

*Note: Calendar events in Italics are new since the last Newsletter*



Comments or questions regarding this newsletter?  
Please contact Bill Berger at (334) 271-2928  
or via e-mail at [bill.ctr.berger @faa.gov](mailto:bill.ctr.berger@faa.gov)